Building an Artificial Language from Scratch: Jœjuca

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Constructed languages, otherwise known as conlangs, are languages that are artificially created to serve some purpose. Dothraki and High Valyrian in *Game of Thrones*, and Quenya in Tolkien's *Lord of the Rings* are some well-known conlangs. This paper describes a novel conlang, Jœjuca: created for fishermen and sailors in the fictional world of Coweun. Jœjuca is used in this fictional world for communication of people that speak different native tongues. Because in its fictional world Jœjuca achieves communication between people speaking different languages, similar to conlangs like Esperanto, it is also an auxiliary language, or an auxlang. Jœjuca was constructed as part of a class project. It was partly inspired from a pidgin (a simplified form of language between two peoples with different languages as a means of communication) which arose between Basque whalers and Icelanders in the 17th century (see for example Etxepare and Miglio, 2015). Our language sought to build on a similar concept, but with a more fully fleshed out linguistic system.

The fictional area in which Jœjuca exists was once a large collective landmass in the middle of an ocean world, with many different peoples under one language and culture. A severe and violent volcanic eruption destroyed the landmass and sunk much of it with floods, and a large island surrounded by other small islands would come to be the new homes of the previously unified people. Having been set back to square one technologically by the volcanic eruption, civilizations started over; each island slowly split away from the original shared language, and after much time had passed, each island and new developing civilization had developed its own unique and distinct language. Still, each island civilization focused on fishing as a means of sustenance and commerce. Eventually, when technology developed further, allowing the civilizations to reconnect with each other through boats, the civilizations attempted to trade with each other only to find that it was extremely difficult without sharing a common language. So much time had passed that the individual languages that had deviated too far from the original languages and communication between island civilizations had become nearly impossible and took great effort. Yet, trade with other civilizations was of great importance to every island and the islanders were determined to be able to communicate with each other by some means. Thus, the need for an auxlang arose, and Jœjuca came to be the method of communication between the islanders.

Jœjuca, being developed as a fishing auxlang, has most of its vocabulary and verbs focused around fishing, fishing accessories, fishing actions, and other fishing related things. When developing the auxlang, this was kept in mind in order to try and maintain the authenticity of the auxlang and its functionality for the imagined sailors and fishermen that use it.

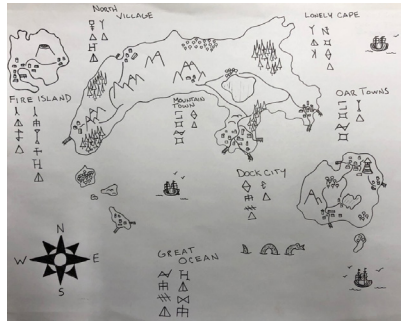

Figure 1: World Map

Figure 1 depicts the map of the fictional world of Jœjuca, including the volcano that destroyed much of the islands and flooded the rest of the land (top left), the many islands around a central island, and the many docks around all of the cities and settlements, which show the importance of fishing to the inhabitants of the islands. Furthermore, the different cities and settlements depicted in our map have their accompanying translation in Jœjucan script directly below them as a visual aid. This script will be discussed in more detail in section 4.

The Sound System of Jœjuca

This section describes and exemplifies the phonological system of Jœjuca, i.e., its vowels, consonants, syllabic structure, and stress system. All of the following linguistics characteristics of the constructed language were molded to best fit the context in which the language exists. For example, many of the linguistic characteristics were created around the image of a sailor speaking a language that "sounds" like something that a sailor would use.

Jœjuca utilizes five different vowels: /a/, /æ/, /œ/, /u/, and /y/, as shown in the vowel chart in Figure 2, which follows the conventions of the International Phonetic Association (IPA, 2003).

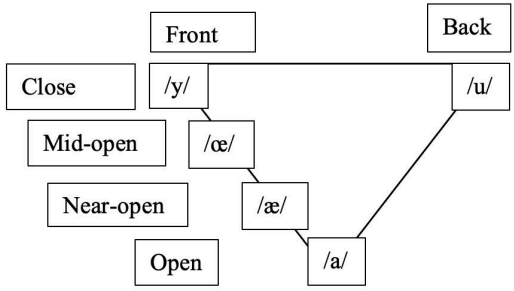

Figure 2: Jœjucan vowel chart

The decision-making process for choosing these vowels for our conlang specifically was quite simple. Due to Jœjuca being an auxlang, we wanted similar vowels to those in some of the most widely spoken languages in the world, namely English, Spanish, and French. We borrowed vowels that we liked from these languages that we thought would fit to our imagined sailors' voices and committed to them. Examples of minimal pairs for the five vowels in our language are provided in (1).

1. Vocalic minimal pairs

- /ly.ra/ ‘bait’ /lœ.ra/ ‘nighttime’
- /mu.ru/ ‘ship’ /ma.ru/ ‘cold’
- /kœ.ra/ ‘cod’ /kæ.ra/ ‘grouper’

(see conventions section 1., 2., and 3.)

As seen by our minimal pairs in (1), Jœjucan roots are not typically very long. Most words in Jœjuca tend to be around two syllables long. Word length will be explored later on in the paper, as suffixes and prefixes are very common, and often stack making derived words longer than roots. For example, a word whose root is two syllables, but has an added prefix and suffix doubles the word length.

Jœjuca uses 18 different consonants, 16 of which are pulmonic (i.e., pronounced with air coming out of the lungs, like most sounds in the world’s languages) and two of which are non-pulmonic (i.e., pronounced with an additional non-pulmonic initiation). The 16 pulmonic consonants are /p/, /b/, /t/, /d/, /k/, /g/, /m/, /ɲ/, /B/, /r/, /v/, /θ/, /ʃ/, /ʐ/, /x/, and /ʎ/. The two non-pulmonic consonants are bilabial and dental clicks: /ʘ/, and /ǀ/. The full consonant charts for pulmonic and non-pulmonic consonants in Jœjuca can be seen in Figure 3 below.

	Bilabial	*Labio dental*	*(Inter) dental*	*Alveolar*	*Post-alveolar*	*Retroflex*	*Palatal*	*Velar*
Clicks	ʘ		ǀ					
Stops (plosives)	p b			t	d			k g
Nasals	m						ɲ	
Trills	B				r			
Fricatives		v	θ		ʃ	ʐ		x
Lateral approximants							ʎ	

The choices for the different consonants in Jœjuca were made on a few primary criteria. One of the criteria was to include unique consonants that sound as if they could be part of English or Spanish, but sound slightly off, as if they did not belong. For example, Spanish includes the use of an /r/ trill, and we implemented a /B/ trill into Jœjuca. Furthermore, we wanted a conlang whose word were full of stops and fricatives, hence the majority of our pulmonic consonants being stops and fricatives: 11 out of 16 of Jœjuca’s pulmonic consonants fall under that categorization. The reasoning behind including so many stops and fricatives was for an added touch of uniqueness to the language, and it was also how the group imagined the sailors

speaking to each other. The non-pulmonic consonants used were clicks, implemented in order to add a sense of uniqueness to the language. Throughout the world's languages, very few utilize clicks: less than two percent of languages include them in their sound inventory, and these are generally found in Southern/Eastern Africa (Maddieson 2013). Unlike clicks found in world's languages, however, clicks in Jœjuca have a unique purpose, since they are used to emphasize and diminish certain words. For example, the word /xœxuka/ (Jœjuca) in our language means 'fish,' but when a bilabial click is added to the end, for example, /xœxukaʘ/ the meaning changes to 'big fish' or 'a grand quantity of fish' depending on the context. Conversely /xœxuka|/ would mean the opposite, as the dental click is meant to diminish words. Possible meanings could be 'small fish' or 'a small quantity of fish.' This small detail in our language, we believe adds a touch of uniqueness to the spoken element. Further information on the pronunciation of both consonants and vowels can be found on an online, interactive International Phonetic Alphabet chart created by Peter Isolato (Isolato, 2003). Minimal pairs for the Jœjucan consonants are given in (2):

2. Consonantal minimal pairs

•	/ʃuk/	'sugar'	/ʐuk/ 'cold'
•	/Bæ/	'hook'	/ræ/ 'net'
•	/vaʃa/	'boat'	/θaʃa/ 'canoe'
•	/kyka/	'river'	/gyka/ 'tree'
•	/ma/	'mine'	/ɲa/ 'food'
•	/tœ/	'shoe'	/dœ/ 'whale'
•	/ʐaBœ/	'sails'	/xaBœ/ 'warm'
•	/payuk/	'north'	/bayuk/ 'south'
•	/ʎeʃ/	'east'	/ɲeʃ/ 'west'
•	/xœxukaʘ/	'large fish'	/xœxuka|/ 'small fish'

Syllable structure in Jœjuca was developed from experimenting with different syllable lengths that we found visually appealing. As far as inspiration goes, we decided not to look for any guidance from other existing real languages or constructed languages, hoping to add uniqueness to our own constructed language. Basic syllable structure in Jœjuca is CV(C)(C) (see conventions section, number 4.). Onsets (i.e., syllable-initial consonants) are always obligatory in Jœjuca; never will a vowel be present without a consonant in front of it. An example of a one syllable word in Jœjuca with just the onset and syll-

syllable is /tœ/ which translates to 'shoe.' Codas (i.e., syllable-final consonants) are also allowed, but are very seldomly used. An example of a word with a coda in Jœjuca is /ɲeʃ/ which translates to 'west.' Diphthongs, much like codas, are also allowed, but are fairly uncommon. An example of a word, or rather, a suffix with a diphthong is /kuœ/ which is the suffix added to nouns to indicate it belongs to the terrestrial class (section 3). Jœjuca also utilizes contrastive stress, albeit rarely. Example of two different words that utilize contrastive stress are /ɲœu/ which translates to 'island,' and /ɲœú/ which translates to 'fast.' Stress in Jœjuca always falls on the last syllable of the word, on the last vowel. For example, the word /rœ.kú/ 'palm tree.'

The Writing System of Jœjuca

Due to the fishing and business context of our fictional world, whatever writing system we designed would have to follow the basis for which the auxiliary language was created. So, what ultimately developed was a runic style alphabet writing system in which each phoneme (including clicks) corresponded to its own letter/rune. The alphabetic writing system can be seen in Figure 4 below:

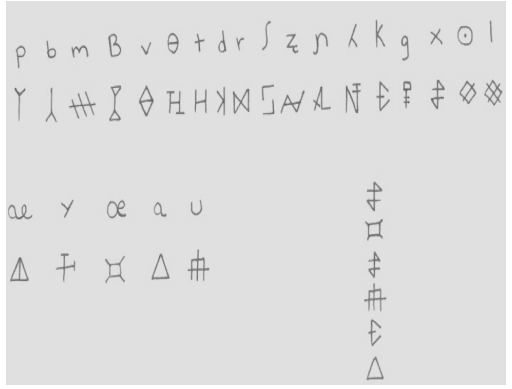

Figure 4: Writing System. Top row: Consonants. Bottom row: Vowels. Bottom column: the word 'Jœjuca' written in our script.

We chose a runic style system for our alphabet due to how our language was mostly spoken between fishermen and sailors yet rarely written. After thinking about contexts in which fishermen and sailors would write, such as carving writings on the side of wooden boats, or wooden crates, or even on signs, it became clear that avoiding curves is the easiest way to carve into wood. Before coming up with the different glyphs for phonemes, inspiration was taken from different existing glyphs from world languages such as Lyndian and Old Turkic.

This led to the birth of a system with mostly rigid lines and no curves in order to fit the context in which our language exists.

The writing of Jœjuca in the bottom right in Figure 4 serves to illustrate how our script is written: from top to bottom.[1] An example of how our script is organized is as follows:

L	T
I	H
K	I
E	S

The development of our writing system certainly helped to envision the world differently. Before developing Jœjuca's unique writing system, the world we had envisioned was only imagined in a speaking sense. By adding a written element, contexts and mediums in which and through which the language exists change and add a new dimension to the language.

A Lexicon of Jœjuca

A mini-lexicon for our conlang was developed by using the Rosenfelder vocabulary generator ('Gen') approach available at https://www.zompist.com/gen.html in combination with other methods, such as creating words which sounded like they would fit in our fictional world. The Gen approach is a technique used to create words for a constructed language by inputting the constructed language's phonetic characteristics into a word generator, which outputs a word list. By using a word generator like Rosenfelder's, many word possibilities are created instantaneously, and meanings can be applied to the words as needed. This provided an efficient approach not only to constructing a mini lexicon that served as the basis of a sample fictional text in this language, but also to expand it for forthcoming writings and translation as needed. Also, Rosenfelder's Gen approach automatically syllabifies words, so cutting off excess syllables to create shorter words is possible, which makes for an even easier word creation process. The following is a list of 32 roots in our conlang which includes nouns, verbs, adjectives and adverbs (3). Most of the roots included refer to seafaring concepts. Note also that adverbs are derived from adjectives through the addition of the prefix /ʃu-/.

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[1] When a line word in Jœjuca is finished, the next word begins to the right of the previous one and is structured from top to bottom as well. No spaces exist between words, as different columns serve to signify the beginning of a new word. Spaces however do exist under the columns. In addition, there are no different glyphs for capital letters, as there is no use for them in our language.

Sections 5 and 6 discuss how these roots are derived to express a range of morphological functions and meanings.

3. Jœjuca roots

Nouns	Verbs	Adjectives	Adverbs
/xa.e.ka/ 'fisheries'	/θœ/ 'to cast'	/xa.θœ/ 'slimy'	/ʃu.xa.θœ/ 'slimily'
/Ba/ 'oars'	/Bœ.xa/ 'to boat'	/θuθ/ 'gross'	/ʃu.θuθ/ 'grossly'
/bæ.xa/ 'islands'	/paθ/ 'to row'	/væ.tu/ 'incredible'	/ʃu.væ.tu/ 'incredibly'
/ɲu.mæ/ 'sailors'	/rœ.ku/ 'to sail'	/zy.rœ/ 'stupid'	/ʃu.zy.rœ/ 'stupidly'
/By.θæ/ 'fires'	/vud.Bæ/ 'to sit'	/θy.vy/ 'small'	/ʃu.θy.vy/ 'smallly'
/ʐu.vu/ 'sterns'	/du.væb/ 'to watch'	/ʐu/ 'peaceful'	/ʃu.ʐu/ 'peacefully'
/ʃuv.py/ 'houses'	/θæp.Bœ/ 'to burn'	/ru/ 'beautiful'	/ʃu.ru/ 'beautifully'
/pæb.dat/ 'families'	/tœ.bu/ 'to walk'	/ʃœ.py/ 'nice'	/ʃu.ʃœ.py/ 'nicely'

Nominal Morphology

Jœjuca encodes number and noun classes, but not case. As far as number goes, our language operates in a default plural, with various prefixes to denote the singular, dual, and collective. Specifically, the prefix for singular is /bu-/, the prefix for dual is /ku-/, and the prefix for the collective is /du-/. For example, if we take the noun /ɲu.mæ/ 'sailors', we can add the appropriate prefixes to denote singular, dual (i.e., two), and collective (i.e., 'all') as shown in (4):

4. Numbers in Jœjuca

- Default plural /ɲu.mæ/ 'sailors'
- Singular /bu.ɲu.mæ/ 'sailor'
- Dual /ku.ɲu.mæ/ 'two sailors'
- Collective /du.ɲu.mæ/ 'all sailors'

The use of the default plural is not uncommon in the world's languages, which was our reasoning for choosing the default plural for our auxlang. Many of the world's languages have an obligatory default plurality for all nouns (Haspelmath, 2013). Yet, English and Spanish do not utilize the default plural, which were two languages we wanted to intentionally distance Jœjuca from.

Instead of differentiating among feminine, masculine and/or neutral nouns, as many world languages do, Jœjuca distinguishes three distinct noun classes: the aquatic, the terrestrial, and the celestial. The aquatic noun class includes things that deal with or are related to water (such as boats, fishes, tides), the terrestrial includes things that

deal with or are related to land (trees, humans, villages), and the celestial includes all things dealing with the sky and other abstract concepts (death, thoughts, birds), along with anything else not covered by the terrestrial or aquatic noun classes. Noun classes like the ones chosen for Jœjuca have observable similarities with other constructed languages such as High Valyrian from Game of Thrones, created by linguist David Peterson. For example, High Valyrian uses lunar, solar, terrestrial and aquatic noun classes (Peterson, 2019). Noun classes are indicated by articles in our language, as exemplified in (5). All can be translated as 'the, a, an'.

5. Noun class articles in Jœjuca
   - Terrestrial: /œ/ /œ du.bæ.xa/ 'all of the islands'
   - Aquatic: /æ/ /æ bu.gæ/ 'the tides'
   - Celestial: /a/ /a ku.paʃ.æ/ 'the two suns'

Noun classes were chosen for Jœjuca not for their lack of popularity or uniqueness, but due to how well they fit within our fictional world: life in our world revolves around the ocean, so it made sense to create noun classes for aquatic things, terrestrial things, and celestial things.

As shown in the preceding section, adjectives are also present in Jœjuca. Yet, these adjectives do not encode number or noun class, which are denoted exclusively by the nominal prefixes and articles discussed above. Adjectives come after the noun that they modify (i.e., 'boat large' rather than 'large boat'). One example is 'incredible tides': /bu.gæ væ.tu/. In addition, articles precede the noun; thus, 'the incredible two suns' would translate as /a ku.pa.ʃæ væ.tu/, where /a/ is the celestial article; /ku.pa.ʃæ/ is 'suns' (i.e. 'sun-dual'), and /væ.tu/ the adjective 'incredible'.

Pronouns in Jœjuca are straightforward in the sense that they are formed by combining the noun class article and the nominal number prefix. For example, the pronoun corresponding to a singular, terrestrial noun is pronoun /buœ/ (singular prefix /bu-/ plus terrestrial article /œ/). Other pronouns formed in similar ways are provided in (6) below.

6. Jœjuca pronouns
   - Terrestrial Singular (Him/Her/He/She/It/etc.): /buœ/
   - Terrestrial Dual (They/Them/Those/etc.): /kuœ/
   - Celestial Collective (A Swarm/A Flock/etc.): /dua/
   - Aquatic Singular (Him/Her/He/She/It/etc.): /bæ/

Verbal Morphology

Verbal morphology in Jœjuca is straightforward and geared to make the language as simplistic as possible. We chose against including agreement, mood, modality, or evidentials in our conlang in order to avoid adding unnecessary rules to complicate language learning for the fishermen and sailors who would be the primary users of the language. Instead, we chose to include both tense and aspect. In Jœjuca, there are three different tenses that are modelled and chosen after the context in which our language is spoken in: fishing and business. Thus, the tenses we chose are past business terms, the current business term, and future business terms. Tense is indicated by suffixes, which are provided and exemplified in (7) below:

7. Jœjuca tense

• Past business term: /-ku/

Example: /rœ.ku/ 'to sail' -> /rœ.ku.ku/ 'to sail in a past business term'

• Current business term: /-mu/

Example: /paθ/ 'to row' -> /paθ.mu/ 'to sail in the current business term'

• Future business term: /-bu/

Example: /Bœ.xa/ 'to boat' -> /Bœ.xa.bu/ 'to boat in a future business term'

The chosen suffixes clearly connect to our world through the use of business terms as our chosen tense, as our auxlang is used for business communications. For example, if a sailor/fisherman refers to a past sailing/fishing expedition or a deal that occurred two days ago, and the current business term had been in effect for the past week and for another five days, then the sailor would refer to his deal as having occurred in the present, even if it had occurred two days ago.

Aspect in our language is also encoded, but through prefixes. The two aspects in our language are the perfective and imperfective, and work in accordance with the three tenses in order to create the past, present, and future perfective, and the past present and future imperfective. The default in Jœjuca is the present perfective and the rest are encoded though affixes. The past perfective is indicated by the /ky-/ prefix and the future perfective is indicated by the prefix /by-/. The present imperfective is indicated by the prefix /mæ-/, the past imperfective is indicated by the prefix /kæ-/, and the future imperfective is indicated by the prefix /bæ-/. Examples are provided in (8):

8. Aspect and tense in Jœjuca

• Past Perfective:	'a sailor sat'	/bu.ɲu.mæ ky.vud.Bæ.vu/
• Present Perfective:	'a sailor sits'	/bu.ɲu.mæ vud.Bæ.vu/
• Future Perfective:	'a sailor will sit'	/bu.ɲu.mæ by.vud.Bæ.vu/
• Past Progressive:	'a sailor was sitting'	/bu.ɲu.mæ kæ.vud.Bæ.vu/
• Present Progressive:	'a sailor is sitting'	/bu.ɲu.mæ mæ.vud.Bæ.vu/
• Future Progressive:	'a sailor will be sitting'	/bu.ɲu.mæ bæ.vud.Bæ.vu/

Morpheme shape in our language borrows from popular languages around the world in the sense that only concatenative morphemes are utilized, and non-concatenative morphemes are never allowed under any circumstances. As far as concatenative morphemes go, only suffixes and prefixes are allowed in Jœjuca, as there are no infixes or circumfixes to encode for any meaning. An example of a concatenative morpheme in our language is the prefix /du-/ which is used to signify the collective: /du.ɲu.mæ/ 'all of the sailors'.

The purpose for limiting verbal morphology to simpler, more common methods found in other popular world languages was to make the auxlang as similar to other languages as possible, and thus make it easier to learn for the fishermen and sailors interested in acquiring the language for trading purposes.

Sentence Structure

In Jœjuca, word order follows a subject-object-verb organization, which was chosen once again for the intentional simplicity that should come when designing an auxlang. SOV word order is the most common word order found throughout real world languages as well (Dryer, 2019). We also chose to do so because adjectives were decided in an earlier challenge to come after a noun, so following suit with verbs made the most sense. Negation in Jœjuca is encoded through the use of the particle /xæ/ before the verb it is negating. Examples of statements with and without the use of negation are given in (9):

9. Statements

• /œ bu.ɲu.mæ θæ.θæ.ku/	'a sailor was cooking'
• /œ bu.ɲu.mæ **xæ** θæ.θæ.ku/	'a sailor was not cooking'
• /œ ʃuv.py θæp.Bœ.mu/	'a house is burning'
• /œ ʃuv.py **xæ** θæp.Bœ.mu/	'a house is not burning'

Polar (aka yes-no) questions are also encoded through the use of a particle; however, the particle is present at the end of the phrase. The particle to encode a polar question is /ʃœ/. Examples of polar questions are provided in (10):

10. Polar questions

- /œ bu.ɲu.mæ θæ.θæ.ku **ʃœ**/ 'a sailor was cooking?'
- /œ ʃuv.py θæp.Bœ.mu **ʃœ**/ 'a house is burning?'

Similarly, negative polar questions combine the negation particle and polar question particle in a single phrase. To structure a negative polar question in Jœjuca, one must add the /xæ/ particle before the word and include the /ʃœ/ particle at the end of a phrase. Examples of negative polar questions are given in (11):

11. Negative polar questions

- /œ bu.ɲu.mæ **xæ** θæ.θæ.ku **ʃœ**/ 'a sailor was not cooking?'
- /œ ʃuv.py **xæ** θæp.Bœ.mu **ʃœ**/ 'a house is not burning?'

Content questions are simple to structure as well, as all that needs to be done is switch the word order from subject-object-verb to subject-verb-object, followed by an interrogative pronoun at the end of the phrase to clarify the response that should be given. Interrogative pronouns in Jœjuca are /ʃœ.vu/ 'who,' /ʃœ.mu/ 'whose,' /ʃœ.bu/ 'what,' and /ʃœ.lu/ 'which.' Commands are indicated by the presence of the particle /kœ.kœ/. There is only one type of command in Jœjuca, as the language is strictly for business and there is no point in overcomplicating business with politeness and/or status.

Fictional Text

As a final, more complete demonstration of the language in action, the following is a fictional text about a sailor on his boat. The following fictional text is glossed and translated according to Leipzig Glossing Conventions (available at https://www.eva.mpg.de/lingua/pdf/Glossing-Rules.pdf), a standardized way of translation in linguistics that shows both the original language, the translated language, and a morpheme-by-morpheme correspondence between both languages.

(Non-standard morpheme abbreviations: col = collective; dua = dual)

vyBœ kuxæ xaxa, ɲœ œ bu-ɲumæ mæ-vud-Bævu
wintertime it is, and a sg-sailor prog-to sit
‘It is wintertime, and a sailor is sitting’

ʃæ bu-ʐuvu ky æ bu-θærœθyvy, bu-kœxæ
on sg-stern of the sg-boat small, sg-fishing pole
‘on the stern of the small boat, fishing pole’

bu-ʐukœxæku, mæ-duvæb a bu-paʃæ mæ-vudBœvu
sg-hand in, prog-to watch the sg-sun prog-to set
‘in hand, watching the sun set’

θæʃœ œ bu-bæxa kæxœ. œ ku-bæxa kæxœ
over the sg-islandhome. the dua-island home
‘over the home island. From afar, the two home islands’

mae-Bapœ vyθœ du-ByθæθyvyMæ-mæxu œ kyʃœ bæxa
prog-to look peaceful sg-fire small prog-to melt the snow island
‘looks peaceful. Small fires are melting the island snow’

Mæ-xykæ xæku bæky ɲa du-kæxy, kœ du-pavœ
prog-to burn in front of col-houses, as col-families
‘burning in front of houses, as families’

mæ-θæθæ xœxu kœmæ. kœ bu-paʃ.æ mæ-xyxœ kyxæ
prog-to cook fish to eat. as sg-sun prog-to sink into
‘cook fish to eat. As the sun is sinking into’

a vœky, buœ xaxa mæ-mykœ æ bu-θærœ
the horizon, he is prog-to turn the sg-boat
‘the horizon, he is turning the boat’

mæ-rœku	ʃuv.py	xae	koebu	œ	Bœky	xæbu	pa
the							
prog-to sail	house	to	to prepare	a	meal	delicious	for
œ							

‘around and is sailing home to prepare a delicious meal for the’

bu-pavœ	vyBœ	xaxa	xævy
sg-family	wintertime	is	calm

‘family. Wintertime is calm.

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Conventions

1. ‘.’ when glossing signify a break in syllables
2. ‘(word)’ is the translated meaning of a word
3. /word/ is the phonetic transcription of a word

4. In CV(C)(C) syllable structure ‘C’ indicates a consonant, whilst ‘V’ indicates a vowel. ‘(C)’ indicates an optional consonant at the end of the syllable (a coda).

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